

JOB COMPLETION REPORT  
SURVEYS AND INVESTIGATIONS PROJECT  
As Required By  
FEDERAL AID IN WILDLIFE RESTORATION ACT  
MISSOURI  
BOBWHITE QUAIL STUDIES

Title: Plant Food Testing--Feeding Experiments on Bobwhite Quail

Federal Aid Project No. 13-R-20

Work Plan No. 2 - Job No. 3

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SURVEYS AND INVESTIGATIONS PROJECTS

STATE OF MISSOURI

Project No. 13-R-20 (1966)

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Title of Job: Plant Food Testing--Feeding Experiments on Bobwhite Quail.

ABSTRACT

Through a cooperative project between the Missouri Conservation Commission Game Research Section and the Soil Conservation Service, Plant Materials Center, Ellsberry, Missouri, a plant food testing-feeding experiment on Bobwhite Quail was conducted in winter of 1966 (Feb.-Mar.).

Four seed feeding tests on 60 quail plus one control were made at the Charles Green Experimental Area.

Results in terms of birds lost and weight variations showed that four foods possessed potential as quail foods.

One food, Bromus arvensis possessed no value as a quail food.

## JOB COMPLETION REPORT

### SURVEYS AND INVESTIGATIONS PROJECTS

#### STATE OF MISSOURI

Project No. 13-R-20 (1966)

Work Plan No. 2

Job No. 3

Title of Job: Plant Food Testing--Feeding Experiments on Bobwhite Quail.

#### Objectives:

To determine by penned feeding experiments of hatchery-raised bobwhite the relative sustaining capacity of various plant foods (seeds-fruits) and their possible use in game food management planning.

#### Procedure:

This investigation resulted from a cooperative arrangement between the Missouri Department of Conservation, Game Research Section and the U. S. Department of Agriculture, Soil Conservation Service Plant Materials Center of Elsberry, Missouri. The study was similar to one conducted in 1965. (See Report Project No. 13-R-19 (1965) Work Plan No. 2 - Job No. 3).

Test foods were supplied by the Plant Materials Center. Testing activities were conducted by the Research staff at the Charles Green Game Experimental Area, Ashland, Missouri.

The University of Missouri Agricultural Experiment Station Chemical Laboratory made the chemical analysis of foods tested.

Birds were confined in 12 x 12 feet pens located in an open brooder house. Ground cover consisted of chopped corn cobs over concrete flooring. Escape cover was provided by piles of cedar boughs. Water, grit and all foods were available ad libitum.

Four plant foods were tested with one food, Autumn olive, being fed in two ways, i.e. dry seeds and fleshy fruits. The experiment consisted of four testing pens plus one control. Test groups contained from 11 to 13 birds with sexes being well divided.

When the quail were received from the hatchery on Feb. 1, 1966, they were grouped, placed in the experimental holding pens and placed on the control diet consisting of Purina Growena, chick scratch (wheat, cracked corn, milo) water, and grit (ad libitum).



## Procedure (cont'd)

All birds were young of the year (produced during June-July-1965).  
The experimental foods used were:

- 1 - Astragalus circer ... Circer milk vetch.
- 2 - Lonicera maacki podocarpa ... Lonicera amur honey suckle.
- 3 - Elaeagnus angustifolia var ... Autumn olive, Cardinal strain.  
(Fed as dry seeds and fleshy fruits)
- 4 - Bromus arvensis ... Field Brome.

All seeds, with the exception of the fleshy olive and honey suckle fruit had been cleaned prior to feeding and were fed in a dry condition.

The winter period of 1966 was extremely mild. Feeding tests were delayed in the hopes that some prolonged cold weather would develop in order to test the foods and birds under low temperature conditions. Such weather failed to occur.

On February 16, after all birds had been on the control diets along with a two week exposure to their experimental diet food, the birds were fed only the test food.

Air temperature during the period ranged from freezing to 60 degrees; the test period was mild and open.

Prior to February 16, the first day that birds were placed on the single test food (control mix withdrawn) each experimental group had consumed small amounts of the test food in their pens with the exception of those birds exposed to Field Brome. No interest had been shown in this food.

On February 19, after three days of experimental feeding, birds were consuming normal amounts of all foods except the Field Brome. All birds were in favorable condition and flying well.

On February 23, after seven days on experimental diets, birds were consuming large amounts of all foods except the Field Brome. Little of the Brome had been consumed.

On March 2, after two weeks of test feeding, the experiment was terminated as the feeding period was adequate to show relative winter survival values of the foods under test.

Findings:

Table I presents a summation of mean weight gains and losses per experimental group plus bird losses.

Individual diet performance was as follows:

Pen 1...Control Diet: Birds on this diet remained in excellent condition throughout the experimental period. Although a slight weight loss of 9.4% occurred, this was insignificant and could well be daily food consumption-weight variation. (Bird weight may vary two to 8 grams on the same day or within minutes).

Pen 2...Astragalus circer: Birds readily consumed this food and remained in excellent flesh and flying condition during the two weeks of the feeding period. With no birds lost and all remaining in good weight, the food showed that, if consumed in the wild, it could well sustain quail under normal Missouri winter conditions.

Pen 3...Lonicera maacki var. podocarpa: This food was offered in its fleshy fruit form and possessed a strong wine odor. It was readily taken by the birds. They remained in excellent weight, alertness and flight condition on it over the two week feeding period. No birds were lost or did any bird suffer noticeable weight losses. Unquestionably, this food could carry wild birds over adverse periods if it were available and the birds would eat it under wild conditions.

Pen 4...Elaeagnus angustifolia var (Cardinal Strain): This food was presented to the birds in two separate feeders, one containing clean, dry seeds, the other having the food in a fleshy (field condition); the latter was somewhat fermented and smelled as good wine. Birds readily consumed large amounts of both foods. (On Mar. 2) Although one bird died during the test, the rest did fairly well on the diet. The 44% body weight loss of the dead hen undoubtedly resulted from factors unrelated to the feeding experiment or to the hen's refusal to consume any of the food; it may have been unpalatable to her. This occasionally occurs with individual birds in feeding tests.

The eleven birds surviving the olive feeding test remained in alert and fine flying condition although weight losses were considerably higher than with the previously described foods. Even with an average weight loss of 28 grams per bird, this autumn olive appears to be of value for quail. If available it would undoubtedly be utilized under wild-winter conditions.

Pen 5...Broums arvensis: The limited consumption of this food and its performance with quail came as no surprise. Such small, dry hulled grass florets containing minute grain or caryopsis often rate low in palatability for bobwhite.

In this test, the birds consumed only minute amounts of the food during the first week. In fact they practically starved themselves rather than take the Brome. Between February 23 and March 2, the birds literally



gorged themselves with the food. In spite of this intake, six birds died between February 26 and March 2. Of the six birds surviving to March 2, four were in extremely poor condition. They would not have survived the last week if they were in the wild. Three of these birds died by March 6.

Average weight loss of the six surviving birds was 56 grams or 29% of body weight. The value of this food as a sole item of diet approached zero.

Table 2 presents the chemical analysis of the four foods tested. As stated in the report of December 1, 1965 on quail feeding test of 1965 we repeat: Wright (1951\*) indicated that the best winter quail foods are high in fat and protein, fairly high in carbohydrates and low in fiber.

One can speculate a long time on the feeding test results in terms of bird weights, losses, and the nutritional value of the individual foods.

The best food showing in the test was Amur honeysuckle, but it is the lowest rating in the protein content with the highest level of carbohydrates. The high percent of fats and carbohydrates apparently result in a highly nutritious food in this case.

All foods, except the Field Brome, possessed good nutritional value. The low nutritional value of Field Brome as a winter food is readily apparent.

In spite of considerable variation in the nutritional levels of Milk Vetch, Amur Honeysuckle, and Autumn Olive, all, supported birds very well. All could be considered a useful item in the diet of the bird, providing he would accept them under wild conditions.

It is encouraging to know that the two woody perennials, Amur Honeysuckle and Autumn Olive possess fruits that will sustain quail if consumed by the birds.

The annual legume, Astragalus cicer, milk vetch, by its showing in these limited tests, should receive additional attention through experimental use in annual quail food plots. This plant may possible have a place in annual food plots on quail management areas.

Work Plan No. 2 - Job No. 3

\*Wright, T., Jr. 1941. A study of the fall food supply of the ring-necked pheasant and the bob-white quail in Washington County, Rhode Island. J. Wildl. Mgmt. 5(3):279-296.

Table 1  
Feeding Tests - Weight (grams) losses: February 16-March 2

Tests - Diets	BIRDS			Feb. 16 - Start		Feb. 23		Mar. 2		Losses - Gains			Remarks
	Males	Females	All	Range	Average	Range	Average	Range	Average	Birds	Average Weight	Average %	
Pen 1: Control	7	6	13	218-170	191	215-158	189	214-171	173	0	- 18 gr.	-9.4	
Pen 2: <u>Astragalus cicer</u>	6	5	11	215-180	199	200-167	189	198-136	176	0	- 23 gr.	-11.5	
Pen 3: <u>Lonicera maacki</u> var. <u>podocarpa</u>	6	6	12	214-176	195	202-170	188	206-170	192	0	- 3 gr.	-1.5	
Pen 4: <u>Elaeagnus angustifolia</u> var.	6	6	12	219-185	198	206-171	180	193-143	170	1♀ Mar. 2 Wt. 110 grs. or 44% body wt. lost	- 28 gr.	-14.1	
Pen 5: <u>Bromus arvensis</u>	6	6	12	227-170	190	212-141	172	183-100	134 (6 birds)	6	- 56 gr.	-291	6 birds lived at end of test. 4 of these were in poor shape-would have died in the wild.



Table 2  
Chemical Analysis of Foods Tested (Percent of total weight)

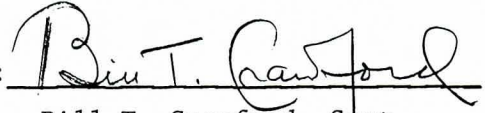
Foods	Moisture	Protein	Fat	Carbo- hydrate	Fiber	Ash	Ca.	P.	K.
<u>Astragalus</u> <u>cicer</u>	5.4	42.62	3.0	31.7	13.4	3.9	0.22	0.44	0.84
<u>Lonicera maacki</u> var. <u>Podocarpa</u>	3.9	9.50	12.3	59.8	8.2	6.3	0.60	0.32	2.16
Wet <u>Elaeagnus</u> <u>angustifolia</u> var.	5.3	22.62	8.7	40.18	18.7	4.5	0.45	0.26	1.34
Dry <u>Elaeagnus angustifolia</u> var. -	4.1	26.75	18.4	26.55	22.2	2.0	0.31	0.24	0.50
<u>Bromus</u> <u>arvensis</u>	5.8	11.63	1.8	66.07	10.0	4.7	0.21	0.38	0.37

Data and Reports:

Original data and related reports in this investigation are on file in the Federal Aid Office of the Missouri Department of Conservation, Columbia, Missouri.

Prepared By:

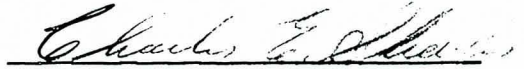
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